

REMARKS1. Claim Rejections under 35 U.S.C. 112, second paragraph

The Examiner has rejected claims 15, 20 and 27 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Examiner has objected to the inclusion of the word “typically” in claim 15, the improper dependency in claim 20 and the lack of clarity regarding the recirculation of the condensate in claim 27. Applicant has amended claim 15 to remove the word “typically” and has amended claim 20 so that it no longer depends from a cancelled claim. The Examiner noted that the previous version of claim 27 was not indefinite. It appears that the word “first” before “reactor” in the last line of the claim was inadvertently omitted in Applicant’s last response. Applicant has amended claim 27 to reinsert this word. Applicant believes that the foregoing claim amendments have obviated the indefiniteness rejections. Reconsideration and removal thereof is respectfully requested.

2. Allowable Subject Matter

The Examiner has objected to claims 13, 16, 31-38 and 41 but has indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim. The Examiner also noted that the word “claim” should precede “8” in claim 32. Applicant has rewritten the above-identified claims and has amended claim 32 as suggested by the Examiner. Applicant believes that the foregoing amendments have obviated the claim objections. Reconsideration and removal of the rejections is requested.

3. Claim Rejections under 35 U.S.C. §102(b) and/or §103

A. The Claims are Not Anticipated or Obvious in view of Andtsjö

The Examiner has rejected claims 8-11, 17, 21-26, 28-30, 39 and 40 as being anticipated by or rendered obvious in view of Andtsjö. The Examiner has also rejected claims 12 and 14 as obvious in view of Andtsjö. The Examiner argues that Examples 11-12 of this reference disclose a two-stage polymerization of propylene including a loop reactor and a gas phase reactor that describes all of the claimed limitations. The Examiner acknowledges that the MFR₂ has not been expressly disclosed but argues that this limitation would be inherent because prior examples have shown that this same catalyst would make a polymer with the claims MFR₂ when hydrogen is substantially or completely excluded (citing Example 3 of Andtsjö). Applicant respectfully disagrees.

Andtsjö et al. describes a polymerization process that is operated at supercritical conditions. Example 3 only discloses that polymerization happens in supercritical conditions. The two Examples cited by the Examiner which allegedly anticipate the invention only disclose the production of heterophasic = block copolymer when homopolymer matrix is produced at supercritical conditions in one loop reactor and rubber is produced in the gas phase reactor. It is apparent that the conditions in the gas phase reactor are not the same as those in the present invention. Specifically, the MFR in the loop reactor (first step) is 16.3/19 and in GPR (second step) 2.6 (viscosity 2.7)/ 3.2 (viscosity 1.3). Consequently, this reference does not anticipate the present invention.

Moreover, it should be noted that the Andtsjö reference does not suggest that the use of the features described in the instant claims would lead to products having high melt strength. The instant process results in linear high melt strength propylene homopolymers and copolymers having a strongly bimodal nature as demonstrated by the different MFR values at each stage. In particular, Examples 11 and 12 of the Andtsjö reference reveal that the C2 content in the gas phase polymer (second step) is 25.5%/23.9% respectively. The invention disclosed in Andtsjö,

therefore, tends to lead to a narrower molecular weight distribution (see page 6, line 7 of Andtsjö) as opposed to the products produced according to the present invention. The foregoing remarks clearly demonstrate the differences between the present invention and the Andtsjö reference. Accordingly, Applicant submits that the Andtsjö reference neither anticipates nor renders the instant claims obvious.

B. The Finality of the Rejection is Improper

In the event that the Examiner maintains the anticipation and obviousness rejections in view Andtsjö et al. (WO 97/13790), Applicant respectfully requests that the finality of the rejection be withdrawn as Applicant's amendment did not necessitate the new ground(s) of rejection presented in this Office Action". As such, Applicant submits that the "finality" of the rejection is improper.

In their last response, Applicant amended the claims to correct misspellings and improper multiple dependencies and to remove objectionable phrases (i.e. "such as" and "preferably". Original claims 18 and 19 were cancelled and the subject matter thereof was incorporated into claim 8. Contrary to the Examiner's assertion, Applicant submits that these changes did not necessitate the new grounds of rejection.

MPEP §706.07 outlines the conditions under which a final rejection is proper on a second action. MPEP §706.07(a) specifically states that a rejection cannot be made final if the rejection is based on information submitted in an information disclosure statement filed during the period set forth in 37 C.F.R. 1.97(c). The Andtsjö reference was cited in the International Search Report and was submitted to the USPTO in an Information Disclosure Statement on March 13, 2000. This reference, therefore, was filed during the period set forth in 37 C.F.R. 1.97(c). As such, Applicant submits that the finality of the rejection is improper and should be removed.

Favorable action and early allowance of all the claims are earnestly solicited.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), the Applicant respectfully petitions for a two (2) month extension of time for filing a response in connection with the present application and the required fee of \$440.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

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D.C. 20231 on: March 18, 2003
(Date of deposit)

BIRCH, STEWART, KOLASCH & BIRCH, LLP

Kathleen Kelly
(Signature)
3/18/03
(Date of Signature)

13. (Twice Amended) [The process according to claim 9,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min, wherein the polymerization reaction is carried out in the presence of a catalyst system, which catalyzes the formation of a high molar mass polymerization product having an MFR₂ of less than 0.04g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5g/10min,

wherein the catalyst comprises a catalyst component, a cocatalyst component, an external donor and, optionally, an internal donor, the procatalyst component of the catalyst system containing magnesium, titanium, halogen and an electron donor, said catalyst system further containing an external donor having the general formula of



wherein R' and R'' are the same or different and stand for a branched aliphatic or cyclic or aromatic group.

15. (Twice Amended) The process according to claim 14, wherein the metallocene compound in the metallocene catalyst is bridged bis(2-R-4-R'-indenyl)M Cl₂, wherein both R and R' are aliphatic, cycloaliphatic or aromatic hydrocarbons having 1 to 18 C atoms, R' is [typically] phenyl or naphthyl, and R is a lower alkyl, M is a transition metal, and R and R' may contain heteroatoms, and the bridge between the indenyls comprises 1 to 3 atoms.

16. (Amended) [The process according to claim 15,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of
- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
 - employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
 - carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min,
- wherein the catalyst system comprises a metallocene catalyst, wherein the metallocene compound in the metallocene catalyst is bridged bis(2-R-4-R'-indenyl) M Cl₂, wherein both R and R' are aliphatic, cycloaliphatic or aromatic hydrocarbons having 1 to 18 C atoms, R' is typically phenyl or naphthyl, and R is a lower alkyl, M is a transition metal, and R and R' may contain heteroatoms, such as silicon, nitrogen, phosphorous or germanium, and the bridge between the indenyls comprises 1 to 3 atoms, such as carbon, silicon, nitrogen, phosphorous or germanium,
- wherein the metallocene compound is dimethylsilyl-bis(2-methyl-4-phenyl-indenyl)zirconiumdichloride.

20. (Amended) The process according to claim [19] 1, wherein said reactors comprise a loop reactor and a gas phase reactor in that order.

27. (Thrice Amended) The process according to claim 25, wherein an overhead stream obtained from the evaporation of volatile components is condensed, a concentrated fraction of propylene being recovered from the condensed stream and recirculated to the first reactor.

31. (Twice Amended) [The process according to claim 28,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min,

wherein the second reactor is a gas phase reactor, wherein propylene and optionally comonomers are polymerized in a gaseous reaction medium,

wherein an overhead stream or part of it is recirculated to the second reactor.

32. (Twice Amended) [The process according to 8,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min,

wherein the second polymerization product is fed into a third reactor and propylene is subjected to a third polymerization reaction to produce a third polymerization product.

35. (Amended) [The process according to claim 8,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min,

wherein

- propylene and optionally other olefins are polymerized in a loop reactor at a pressure of 25 to 80 bar, at a temperature of 60 to 100°C to provide a low or medium molar mass polymerization product of $MFR_2 > 0.5$,
- the polymerization product of the loop reactor is recovered and conducted to a flash tank, wherein an overhead product containing hydrogen and non-reacted propylene is separated from a bottom product containing polymerized solids,
- the bottom product is conducted to a gas phase reactor,
- additional propylene and optionally other olefins are fed to the gas phase reactor,
- the additional propylene and optionally other olefins are subjected to polymerization at a pressure of 20 bar or more to provide a high molar mass polymerization product of $MFR_2 < 0.1$,
- the polymerization product of the gas phase reactor is recovered and conducted to a flash tank, wherein the pressure of the product is reduced to produce an overhead product containing hydrogen and non-reacted propylene and a bottom product primarily containing polymerized solids,
- at least a part of the overhead product is recycled to the gas phase reactor, and

- polypropylene polymer or copolymer is recovered from a part of the bottom product of the flash tank.

38. (Twice Amended) [The process according to claim 8,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR_2 of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR_2 of more than 0.5 g/10 min, wherein
 - propylene and optionally other olefins are polymerized in a loop reactor at a pressure of 25 to 80 bar, at a temperature of 40 to 100°C to provide a high molar mass polymerization product of $MFR_2 < 0.1$,
 - the polymerization product of the loop reactor is conducted directly to a gas phase reactor fluid bed,
 - additional propylene and optionally other olefins are fed to the gas phase reactor,
 - the additional propylene and optionally other olefins are subjected to polymerization at a pressure of 20 bar or more to provide a low or medium molar mass polymerization product of $MFR_2 > 0.5$,
 - the polymerization product of the gas phase reactor is recovered and conducted to a flash tank, wherein the pressure of the product is reduced to produce an overhead product containing hydrogen and non-reacted propylene and a bottom product primarily containing polymerized solids,
 - at least a part of the overhead product is recycled to the gas phase reactor, and

- polypropylene polymer or copolymer is recovered from a part of the bottom product of the flash tank.

41. (Thrice Amended) [A product prepared by a process according to claim 8,] A process for preparing linear high melt strength propylene homopolymers and copolymers, comprising the steps of

- subjecting propylene and optionally other olefins to polymerization in a plurality of polymerization reactors connected in series wherein said reactors are selected from the group consisting of loop reactors and gas phase reactors and wherein said reactors comprise at least one loop reactor and at least one gas phase reactor,
- employing different amounts of hydrogen as a molar mass modifier in at least two of the reactors, and
- carrying out the polymerization reaction in the presence of a catalyst system which catalyzes the formation of a high molar mass polymerization product having a MFR₂ of less than 0.1 g/10 min and a low or medium molar mass polymerization product having a MFR₂ of more than 0.5 g/10 min, which is nucleated for higher crystallization temperature, stiffness and optical properties.